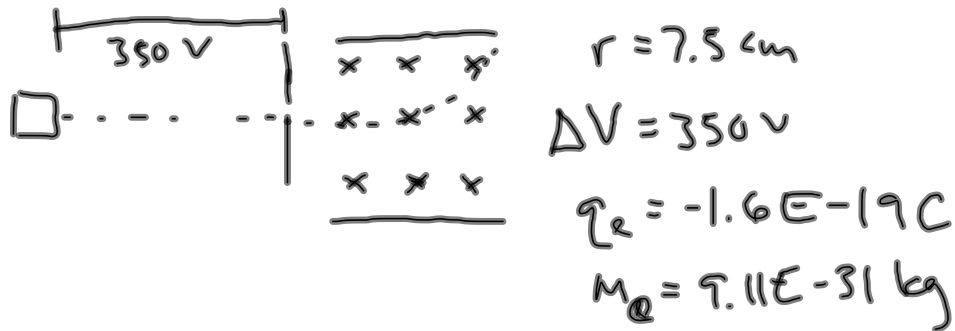


Semester Exam Notes AP Physics 1.6.12

In an experiment designed to measure the magnitude of a uniform magnetic field, electrons are accelerated from rest through a potential difference of 350 V and then enter a uniform magnetic field that is perpendicular to the velocity vector of the electrons. The electrons travel along a curved path because of the magnetic force exerted on them and the radius of the path is measured to be 7.5 cm. What is the magnitude of the magnetic field?



$$\Delta K + \Delta U_e = 0$$

$$\frac{1}{2} m (v_f^2 - v_i^2) + q \Delta V = 0$$

$$v_f = \sqrt{\frac{-2q\Delta V}{m}}$$

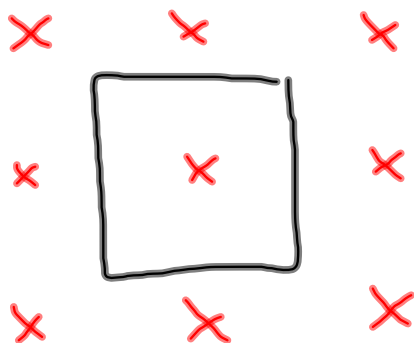
$$= 1.1 \times 10^7 \text{ m/s}$$

$$r = \frac{mv}{qB}$$

$$B = \frac{mv}{qr}$$

$$= 8.4 \times 10^{-4} \text{ T}$$

A coil consists of 200 turns of wire. Each turn is a square of side $d = 18$ cm, and uniform magnetic field directed perpendicular to the plane of the coil is turned on. If the field changes linearly from 0 to 0.50 T in 0.80 s, what is the magnitude of the induced emf in the coil while the field is changing?



$$\begin{aligned}\mathcal{E} &= \frac{\Delta}{\Delta t} (-NAB \cos \theta) \\ &= -NA \cos \theta \frac{\Delta B}{\Delta t} \\ &= -4.05 \text{ V}\end{aligned}$$